

HISTORY OF BEEKEEPING IN THE UNITED STATES

By EVERETT OERTEL¹

The honey bee (*Apis mellifera* L.) is not native to the Western Hemisphere. Stingless bees (Meliponids and Trigonids) are native to the West Indies, as well as Central and South America. Wax and small amounts of honey were obtained from stingless bee nests by the early Indians of these areas.

Information available indicates that colonies of honey bees were shipped from England and landed in the Colony of Virginia early in 1622. One or more shipments were made to Massachusetts between 1630 and 1633, others probably between 1633 and 1638. The author was not able to find any records of importing honey bees into other Colonies, but it is reasonable to assume that they were brought by the colonists to New York, Pennsylvania, Carolina, and Georgia.

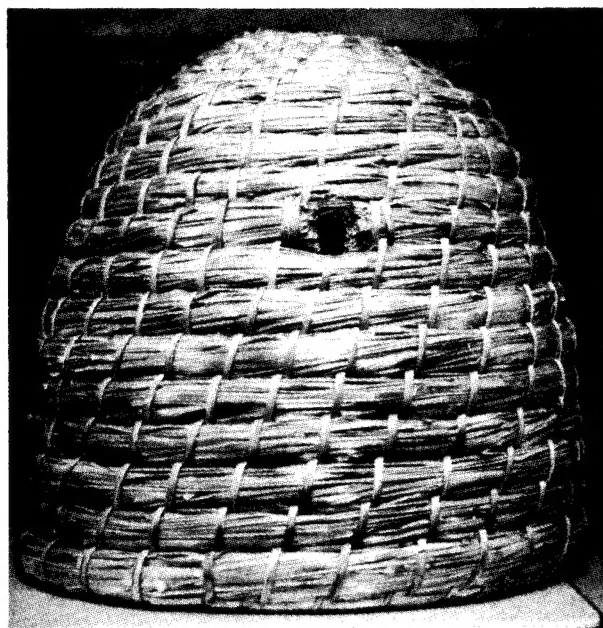
Records indicate that honey bees were present in the following places on the dates shown: Connecticut, 1644; New York (Long Island), 1670; Pennsylvania, 1698; North Carolina, 1730; Georgia, 1743; Alabama (Mobile), 1773; Mississippi (Natchez), 1770; Kentucky, 1780; Ohio, 1788; and Illinois, 1820 (Oertel 1976). By 1800, honey bees were widely distributed from the Atlantic Ocean to the Mississippi River.

Honey bees may have been taken to Alaska in 1809 and to California in 1830 by the Russians, according to Pellett (1938), but no records are available as to whether they survived. In the 1850's, bees were shipped from the Eastern States to California. A few hives were taken over land, but most of the hives were sent by ship to Panama, by land across the Isthmus, and then by ship to California. Probably, the bees reached Oregon and Washington from California in natural swarms or in hives taken there by settlers. There are no dependable records that describe how bees spread westward from the Mississippi River into the

Mountain States. It seems likely, however, that bees moved into these areas the same way they did into Oregon and Washington; that is, in natural swarms or in hives carried by the early settlers.

Development of Modern Equipment

For thousands of years, colonies of honey bees were kept in wooden boxes, straw skeps, pottery vessels, and other containers. Honeycomb built in such hives could not be removed and manipulated like the movable combs of today. No doubt the first hives used in the American Colonies were straw skeps (fig. 1). Later the abundance of cheap lumber and lack of trained people to make straw hives caused a fairly rapid shift to box hives made of wood. Log gums, that is, sections of bee trees containing colonies of bees, occasionally were



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FIGURE 1.—The straw skep was used widely in Europe, but very little in North America.

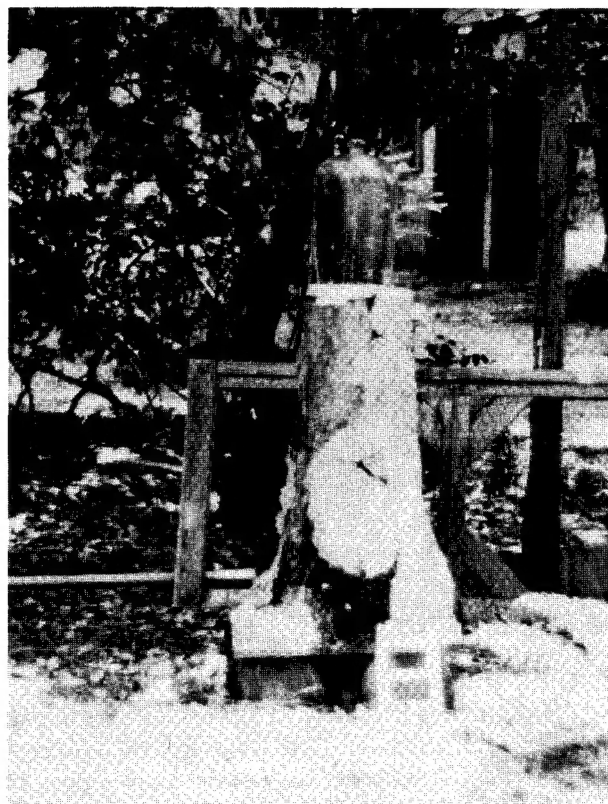
sawed out and used as hives. A few gums may be in use even now, particularly in wooded, isolated areas (figs. 2 and 3). Some ingenious farmers built wood hives with easily removable tops (caps) so that chunks of honey could be removed without killing the colonies. Affleck (1841) showed caps (now called supers) in his illustrations, but he did not give any details such as when they were first used.

In 1852, L. L. Langstroth, a Congregational minister from Pennsylvania, patented a hive with movable frames that is still used today. The principle upon which Langstroth based his hive is the space kept open in the hive to allow bees passage between and around combs. This space is about three-eighths of an inch wide; space that is less than this is sealed with propolis and wax, while space wider is filled with comb. Before this time hives were either Greek bar hives or leaf hives that



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FIGURE 2.—An unusually tall bee gum.



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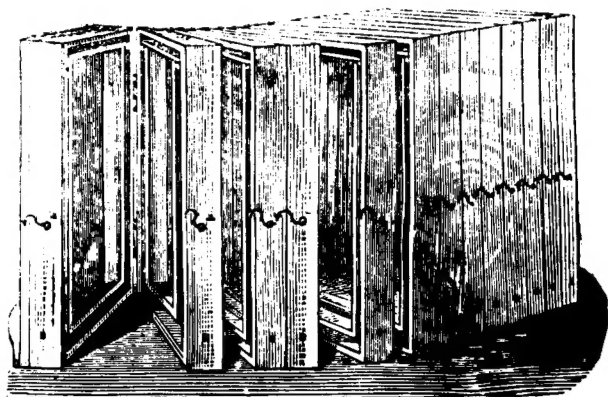
FIGURE 3.—Bee gum with glass jar on top for honey storage.

allowed the beekeeper to inspect the comb (fig. 4). Langstroth is called "the father of modern beekeeping."

In the period between the importation of honey bees by the early colonist and invention of the movable frame hive by Langstroth, beekeepers had little capability for managing their colonies. They increased their number of colonies each spring by capturing swarms and killed them in the fall by burning sulfur at the entrance of the hive so that the honey and beeswax could be removed. The comb, then, was crushed to squeeze out the honey.

Honey generally was obtained (1) by cutting bee trees and taking what honey was available, (2) by killing colonies and taking the honey within the hive, or (3) by taking whatever honey was stored in a crude super or cap that was placed on the hive during the summer.

Modern methods of beekeeping came very rapidly following Langstroth's patent. Other inventions soon followed that made large-scale, commercial beekeeping possible. Wax-comb foundation,



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FIGURE 4.—Book hive with hinged frames used by François Hüber in Switzerland, who published his observations in 1792.

invented in 1857, made possible the consistent production of straight, high-quality combs of predominantly worker cells. Pellett (1938) gives a detailed account of the development of wax-comb foundation. The invention of the centrifugal honey extractor in 1865, and its subsequent improvements, made possible large-scale production of extracted honey. The bee smoker, as now used by beekeepers, evolved from a pan used to contain some burning, freely smoking material, the smoke of which could be blown across the open hive to control the bees. The all-important bee veil gradually evolved from pieces of coarse cloth that were wrapped about the head of the beekeeper.

Introduction of Italian Stock

No one knows how many colonies or hives of honey bees were brought to the American Colonies by the first settlers. Nor do we know from what countries they came: England, Holland, France, Spain, or perhaps somewhere else? It is likely that after the early imports all increase was by natural swarming. Since we do not know how many colonies were brought to the east coast, we cannot determine the degree of inbreeding.

In the 1850's, the superior merits of the Italian race of honey bees became known to a few leaders of American beekeeping and they attempted to import queen bees from Italy. Accounts of these first efforts are confusing, but according to Pellett (1938), the first known successful importation of Italian queen bees was made in 1860.

During the last part of the 19th century, some queen bees of other races were brought into this

country. They were imported from Egypt, Cyprus, the Holy Land, Syria, Hungary, and Tunisia, according to Pellett (1938). None of those races, or selections, was of lasting use in the United States, however. Carniolan and Caucasian queen bees also were imported and still are used to a limited extent. The bee journals and the trade catalogs from about 1870 until after World War I carried advertisements for imported queen bees or their progeny, largely Italian stock. Today, the American version of the Italian race is widely used throughout this country.

Imported Italian queen bees were advertised for sale by L. L. Langstroth and Sons, Oxford Ohio, in 1866, but no prices were given. Those interested were advised to write for a price list. In 1867, Adam Grimm, Jefferson, Wis., advertised imported Italian queen bees for sale at \$20 each. He promised to sell medium-sized colonies of bees, with imported queens, in movable comb hives for \$30 each in 1868. Others who advertised Italian queen bees for sale in 1867 were C. B. Bigelow, Vermont; A. Gray, Ohio; Ellen S. Tupper, Iowa; William W. Cary, Massachusetts; and K. P. Kidder, Vermont. This last group did not quote prices. Egyptian queen bees were offered for sale by Langstroth and Sons and A. Gray, but no prices were quoted. Charles Dadant, Illinois, offered imported Italian queen bees for sale at \$12 each.

The originally introduced dark bees of northern Europe predominated throughout much of the United States and Canada during the 1800's and into the 1900's. Strains present toward the end of that era tended to be irritable and nervous, running readily over the combs and hive. These strains were also subject to European foulbrood disease. Queen bees were shipped from Europe in large numbers from the 1880's to 1922, when a law was passed prohibiting further imports. The purpose of this law was to prevent introduction of the acarine mite, which was causing serious problems in Europe, into the United States.

As queen rearing developed into a large-scale commercial enterprise in the Southern States and Italian queens from Europe were used extensively in the breeding program, a strong, Italian-type bee predominated. Before the end of the 1920's, however, after years of persistent requeening with southern queens, northern beekeepers largely replaced the black bees with a less nervous, Italian-type bee that resisted European foulbrood.

Queen Bee Rearing

As the number of colonies owned and operated by individual beekeepers increased, a market developed for young queen bees. In 1861 Henry Alley, William Carey, and E. L. Pratt, all of Massachusetts, began producing queens for sale. These early producers used narrow strips of comb containing eggs and larvae which they fastened to the top bars or partial combs. When these materials were added to swarm boxes that were queenless, queen cells formed. The queen cells were distributed individually to queenless colonies for mating.

G. M. Doolittle, Onondaga, N.Y., in 1889 developed a comprehensive system for rearing queen bees that is the basis of bee production today. His system, essentially, was making wax cups and placing worker bee larvae into them from which the queen-rearing bees formed the queen cells. This same system, or some modification of it, is used today by all commercial queen rearers.

Since 1886 queen bees have been sent in the mail, which has benefited both buyers and sellers (Pellet 1938). Losses in transit have been reported from time to time, but on the whole, shipment by mail has been satisfactory. Post offices will accept either single queen cages or several cages stapled together. About a million queen bees are sent in the mail annually. Most of these bees are mailed to places in the United States and Canada, but some are sent to other countries.

Recent developments include the crossing of selected inbred lines to produce hybrid bees, and as of 1977, the direct sale of artificially inseminated queens. This step marks the beginning of a new era in bee breeding, in that male and female lines can now be controlled in a commercial breeding program.

Commercial Beekeeping

From the beginning of beekeeping in the 1600's until the early 1800's, we assume that honey was largely an article of local trade. Many farmers and villagers kept a few colonies of bees in box hives to supply their own needs and those of some friends, relatives, and neighbors (fig. 5). According to Pellett (1938), Moses Quinby of New York State was the first commercial beekeeper in the United States as his sole means of livelihood was producing and selling honey. Quinby (1864) described the



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FIGURE 5.—Box hive used widely in the United States before movable frame hives became available.

box hives that he built so that combs of honey could be removed without first killing the colonies. Quinby writes of his financial returns as: "In particularly favorable seasons, hives will yield a profit of one or two hundred percent—in others, they hardly make a return for trouble." Quinby, after experimenting with a few movable comb hives, gradually replaced his box hives with the movable comb-type and advised others to do likewise.

Other beekeepers in Quinby's neighborhood used his methods and began to produce honey on a commercial scale. As the use of movable comb hives, comb foundation, and improved honey extractors became more widespread, commercial beekeeping spread into other States. Poor roads and the use of horse-drawn vehicles restricted the size of the area in which a beekeeper could operate and the number of colonies that could be managed profitably. After World War I, however, with better highways and increased use of motor vehicles and more efficient methods of colony management and honey handling, commercial beekeepers throughout the United States were able to expand the size of their businesses. By 1957 Anderson (1969) estimated that 1,200 professional beekeepers operated 1,440,000 colonies in the United States. By that time, hobbyists had a few

colonies, the part-time beekeepers kept from 25 to 300 colonies, and the commercial beekeeper had up to several thousand colonies. Some U.S. beekeepers have owned as many as 30,000 colonies.

Comb or Section

The term "section" used here describes the honey produced in small wooden frames or sections. The production of section honey is, to coin a phrase, "the fanciest product of the beekeeper's art." Probably, section honey was first produced in the 1820's. Moses Quinby produced section honey in the 1830's and 1840's and did not claim that the method originated with him. Honey was produced by cutting large holes in the top of a box hive, setting a shallow cap on the hive, and filling the cap with wooden sections that might have small comb starters fastened to them. A cover was placed over the hive. The sections, which were of various sizes, might contain up to 4 pounds of honey when filled. Some beekeepers inverted glass containers over the holes in the box hive, and if they were lucky had honey stored in them.

The crude method of section honey production was gradually abandoned as more and more beekeepers began to use movable comb hives. The large homemade section boxes were replaced with smaller, factory-made ones. Supers especially fitted to hold the sections were developed. Manufacturers sold 45 million to 55 million sections annually in the years just before World War I. Between about 1875 and 1915, approximately one-third of the honey produced in New England, New York, Pennsylvania, the Midwest, and a few Western States was in the form of section honey. Generally, the nectar flow in the Southern States was not suitable for section honey production.

Increase in Production of Extracted Honey

The amount of section honey produced declined rapidly after World War I. The product was fragile and difficult to ship; shelf life was short and combs were likely to leak or granulate. Production of section honey required a heavy nectar flow of several weeks' duration, and a great deal of hand labor for cleaning, weighing, and grading. In addition, beekeepers were unable to provide the intensive colony management needed in outyards miles from their homes. The Pure Food Law of

1906 gave buyers more confidence in the purity of extracted honey, thereby increasing demand for it. During the sugar-short period of World War I, the demand for honey increased and, as the price was high, production of extracted honey increased rapidly.

Large amounts of liquid honey were shipped in wooden barrels in the last part of the 19th century. Then 60-pound metal cans came into general use. Today, most bulk honey is sold in steel drums.

Development of Honey-Packing Plants

As commercial honey producers increased the size of their operations, they found it difficult to pack and sell the crop on the retail market and specialized honey-packing plants developed in the 1920's. Packing plants now are very sophisticated in packing liquid or smoothly crystallized honey.

Beeswax

Beeswax was an article of commerce soon after it became available in the Colonies. It was widely used in candles at home and abroad. The wax was melted, poured into molds, and then transported to market. North Carolina in 1740 and Tennessee in 1785 permitted taxes to be paid in beeswax because of the shortage of money (Oertel 1976). Information is not available about how much beeswax was produced or used in the Colonies in the 1600's and the first part of the 1700's. Beeswax was an article of export in the 18th century, particularly from the ports of Philadelphia, Charleston, Pensacola, and Mobile. In 1767, a total of 35 barrels of beeswax were exported from Philadelphia and 14,500 pounds from Charleston in 1790. Beeswax was listed in articles exported from the British Continental Colonies in 1770:² Value 6,426 pounds sterling; 128,500 pounds weight; 62,800 pounds to Great Britain; 50,500 pounds to Southern Europe; 10,000 pounds to Ireland; and the rest to the West Indies and Africa. Honey was not mentioned.

Bee Supply Manufacturers

No doubt, before the invention of the movable comb hive, beekeepers made their own box hives. Movable comb hives and frames must be cut to exact measurements, so machine methods grad-

² Taken from *Historical Statistics of the United States*, 2 parts, 1975, Bureau of the Census, U.S. Department of Commerce.

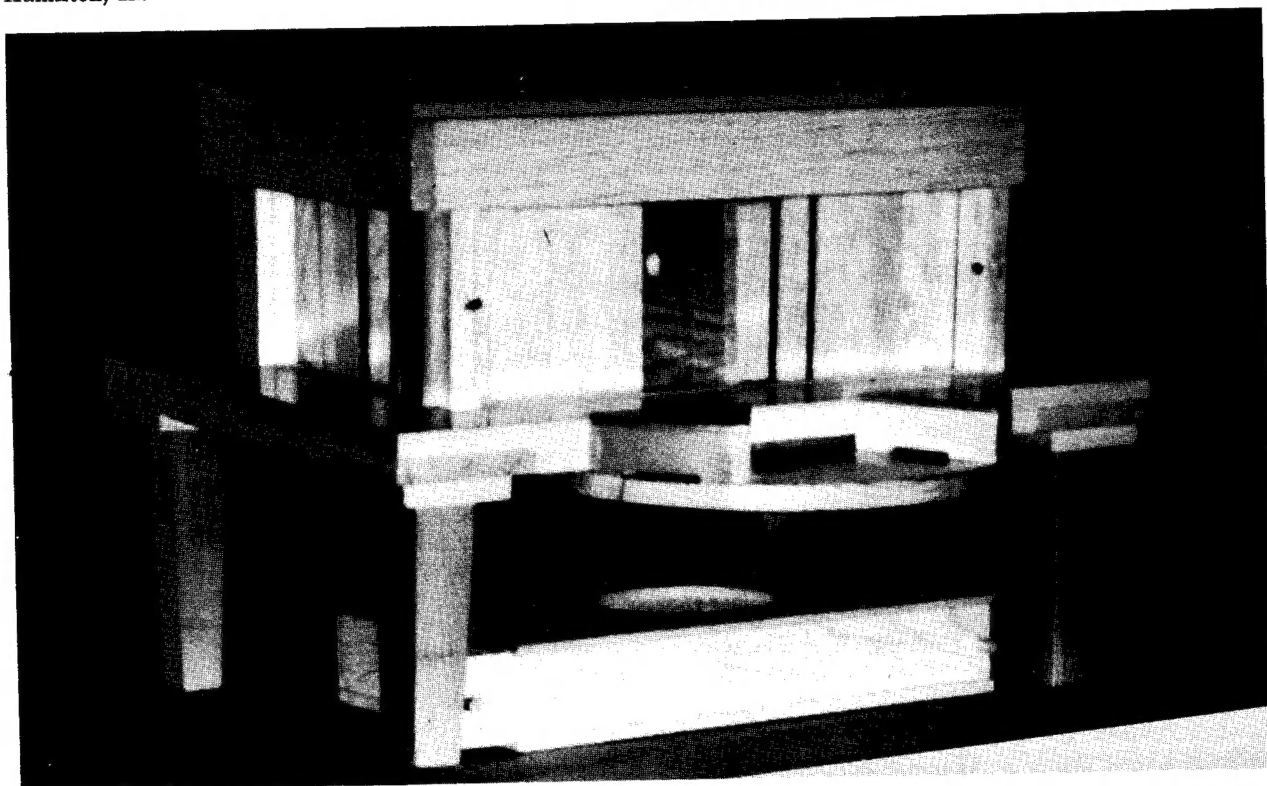
ually took over from manufacture by hand. As metal honey extractors came into general use, companies began to offer them for sale. C. P. Dadant began to sell bee hives and frames to his neighbors in 1863 and comb foundation in 1878.³ By 1884, Dadant and Sons had sold 60,000 pounds of comb foundation throughout the United States.³ In 1867, C. B. Bigelow of Vermont advertised that he sold the Langstroth bee hive (fig. 6). In 1868, J. Tomlinson, Wisconsin, had honey boxes and frames for sale. In the same year, the National Bee-Hive Company, Illinois, sold bee hives, frames, honey boxes, and honey extractors.

A. I. Root and Moses Quinby started to sell bee supplies in 1869. In 1870, Henry Alley, Massachusetts, sold the Langstroth hive, and A. V. Conklin, Ohio, sold the Diamond bee hive. Later on in the 1870's, Alley offered the Bay State hive for sale, claiming that this was the "best hive in use." Edward Kretchmer, Iowa, began to manufacture and sell supplies in 1874. The W. T.

Falconer Co., New York State, started its bee supply business in 1880. At about this same time, P. L. Viallon, Louisiana, began to manufacture and sell bee hives.

Today's beekeeper, who is used to large colonies of bees, would be amused or puzzled if he could see the small hives used in the American Colonies, and even in the States until about 1900 to 1920. The small hives meant small colonies of bees, small crops of surplus honey, and many swarms. Several old books the author consulted stated that a beekeeper should be well pleased if a colony contained 10,000 to 25,000 bees. Even Moses Quinby, a leading beekeeper in the mid-1880's, stated that a 12- by 12- by 14-inch hive (excluding the cap or super) was large enough for use in New York State and an even smaller hive probably would be adequate in warm climates. Quinby thought that 25 pounds of honey was sufficient to last a colony from October 1 to the following April. Charles Dadant, on the other hand, advocated large hives and strong colonies of bees. Over the years, other beekeepers became convinced that a colony must have a large population at the beginning of the nectar flow, an accepted practice today.

³ Personal communication from Dadant & Sons, Inc., Hamilton, Ill.



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FIGURE 6.—Model of Langstroth's original movable-frame hive, with the front removed to show the frames.

Twentieth Century

During the 20th century, the dimensions of bee hives and frames became more standardized, thus eliminating the various sizes that were so confusing 100 or more years ago. The 10-frame movable comb hive is now used throughout the world wherever beekeeping is seriously practiced. Most beekeepers use full-depth standard hive bodies for brood chambers; some also use them for honey supers, while others use shallow or half-depth bodies. Development of strong colonies for major nectar flows rests upon such fundamentals as hive room, adequate stores, and high-quality queen bees. Commercial and part-time beekeepers control swarming in their colonies, but beginners still have difficulties. Drugs (antibiotics) are now available for the control of foulbrood and noseema disease. Artificial insemination of queen bees, that is, controlled mating, is being used commercially to a limited extent.

The rental of colonies for the pollination of certain crops has increased markedly in this century, although management of colonies for such purposes needs to be improved.

The wax moth (*Galleria mellonella*) has been a serious pest of stored combs and weak hives. A limited survey by Williams (1976) showed that in recent years annual losses caused by the wax worm ranged from \$48,000 in Louisiana to \$1,016,000 in Florida. Such early writers as Affleck (1841), Langstroth (1862), and Miner (1859), gave much space to the damage caused by this pest and how it might be controlled. A number of patents were issued in the 1840's and 1850's for various devices that were supposed to keep wax moths from entering bee hives. None was effective. Chemicals have been used with some success, and the feasibility of using biological control methods is being studied.

Research Sponsored by U.S. Department of Agriculture

A full description of apicultural research, as conducted by the U.S. Department of Agriculture, needs much more space than can be devoted to it here. Consequently, only a brief outline is given. In 1860 William Bruckisch, a German immigrant, suggested that the U.S. Government should conduct investigations in beekeeping, and money was set aside to start such research in 1885. Those who

have had responsibility for guiding this program are listed below:

N. W. McLain—1885–87, discontinued because of lack of funds.

Frank Benton—1891–1907, work suspended in 1896–1897; no funds. Spent much of his time locating and shipping stock from Europe.

E. F. Phillips—1905–06, acting; 1907–24

J. I. Hambleton—1924–58

C. L. Farrar—1958–61

F. E. Todd—1961–65

S. E. McGregor—1965–69

M. D. Levin—1969–75

E. C. Martin—1975–79

The following did some of their research while employed in the USDA's Division of Bee Culture. Their names were well known in the earlier part of this century.

James A. Nelson—author of *The Embryology of the Honey Bee*. 1915.

R. E. Snodgrass—author of *Anatomy and Physiology of the Honeybee*. 1925.

G. F. White—basic bulletins on bee disease, 1906–20.

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